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ABSTRACT

The two studies established an empirically derived set of guidelines for producing and evaluating microcomputer courseware for students with learning disabilities. About 100 teachers of learning disabled students in Pennsylvania and Virginia participated in field testing the guidelines. The first study was conducted in four steps: first, development and validation of the instrument; second, establishment of interrater agreement on one piece of courseware; third, rank ordering by teachers of the importance of criteria on the instrument; and fourth, use of the instrument to rate four pieces of courseware. Study 2 duplicated the third step of the original study with different teachers. The conclusions of the study established nine essential criteria for evaluating and producing software: (1) directions the students must read should be simple; (2) alternate means of presenting the same concept must be provided; (3) the screen must be uncluttered; (4) minimal keyboard skills should be necessary; (5) feedback regarding correctness or incorrectness must be provided; (6) adequate opportunity to review concepts must be provided; (7) very basic skills that non-handicapped students would learn incidentally must be taught; (8) prompts to keep students moving through the program must be provided; and (9) the courseware must aim for mastery learning. The questionnaire and tables are appended. (Author/DB)

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MICROCOMPUTER EVALUATION AND PRODUCTION GUIDELINES FOR STUDENTS WITH LEARNING DISABILITIES: TWO STUDIES

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Microcomputer Courseware Production and Evaluation Guidelines for Students With Learning Disabilities: Two Studies

Introduction

Recent investigations have shed little light on the effectiveness of computer assisted instruction for the learning disabled. Although the benefits of CAI seem to be compatible with what special educators feel are the needs of learning disabled students (Cartwright, Cartwright & Ward 1984) the microcomputer continues to be underutilized or ineffectively used in the LD curriculum. The reason appears to stem from research that shows that CAI is no more effective than traditonal instruction (Sandals 1979, Edwards, Norton, Taylor, Weiss & Dusseldorp 1975, McDermott & Watkins 1983, Blaschke 1986).

Educational research is often accused of having little impact on practice because it occurs in isolation. This seems to be the case with CAI research. Two isolated groups of researchers are searching for answers to the same question from two angles with no integration of effort. Group one concludes that the reason for the lack of achievement among LD students using CAI might be a problem in the quality of the courseware (Visonhaler & Bass 1972, Edwards, Norton, Taylor, Weiss & Dusseldorp 1975, McDermott and Watkins 1983). However, no follow-up research supports this conclusion.

Group two reports that certain components of computer courseware must be present for CAI to benefit the learning disabled (Splittgerber 1979, Sandals 1979, Thompson 1980, Grimes 1981, Hannaford & Taber 1982, Hegarty 1982, Hofmeister 1982). Their assertions are never tested.

Blaschke (1986) reported that the number of micro-computers used in LD classrooms has grown from 60,000 in 1983 to 200,000 in 1985. Therefore, it is extermely critical that courseware quality improve to meet the needs of this rapidly growing user-group if, indeed, the research on the effectiveness of CAI is accurate. Otherwise, valuable classroom instructional time will be wasted on the computer with little or no significant increase in achievement.

Study 1

Findings

The research reported here synthesized the findings of the two groups of researchers who feel that courseware must be produced and presented differently to benefit learning disabled children. Elementary and secondaty learning disability classroom teachers were asked to determine which of the elements reported in the literature they felt were essential in computer courseware. Teachers derived seven essential components of computer courseware:

1. Directions the students must read should be simple enough as to not interfere with the students' comprehension;
2. The courseware must provide alternate means of presenting the same concept if students do not comprehend the first presentation;
3. The screen must be uncluttered;
4. Students should be able to operate the program with minimal keyboard skills;
5. The program must provide praise/feedback regarding the correctness or incorrectness of responses.

6. The courseware must provide adequate opportunities for students to review concepts;
7. The software must teach very basic skills that non-handicapped students would learn incidentally;

Items included on the research questionnaire that teachers did not rank essential were:

1. The program requires students to respond in some manner before moving to the next frame;
2. Adequate prompts are imbedded in the program to curtail the impulsive student and encourage the hesitant student;
3. Double-spacing between lines of type;
4. The program provides for overlearning;
5. Program uses effective animation, color-cueing, and/or underlining to focus students' attention on relevant aspects to be learned;
6. Answers are multiple choice rather than requiring students to compose answers;
7. The type of lettering is conducive to preventing reversals;
8. The program provides for competition;
9. The program has a speech synthesizer (or the potential for a speech synthesizer) to provide auditory output to students.

From the essential components list it should be evident that teachers want more than drill-and-practice courseware and publishers should be moving to well-designed tutorials that evaluate student responses and systematically teaches

skill areas that are deficient in the students' cognitive structure.

In addition, it was found that the importance of these items for inclusion in computer courseware was independent of usage in production of courseware evaluated in this study. This indicates that producers of microcomputer courseware materials would benefit from establishing empirically derived guidelines for inclusion in the production of their computer materials.

A surprising finding of the study was that teachers feel that there is no need for the computer to become anything more than a visual medium of instruction. Item 16 of the research questionnaire addressed the component of using add-on peripherals such as CCD's and speech synthesizers. This item was rated totally independent of all other items on the questionnaire. Hagan (1984) reports that the computer is the first educational tool that has the capability of truly teaching students using their modality strength and the possibility exists today of realizing that capability. It is surprising that teachers would not be more concerned with maximizing this tool for students who have severe reading disabilities.

Procedures

A four-step research design was used in this study. First, a 16 item questionnaire syntesized from the literature on components of courseware was developed. To be included as one of the items on the questionnaire, the item had to meet two criteria:

1. the item had to fall with the domain of accepted

learning theory regarding the education and achievement of learning disabled learners;

2. the item had to fall within the domain of what proponents of CAI claim are the optimal benefits of computer assisted instruction.

The 16 items along with their ratings are reported in Table 1.

Twenty teachers from the Tri-County Intermediate Unit in Edinboro, Pennsylvania developed the research instrument used in the study. Teachers from this IU were used in the initial steps of the research because of the above average amount of

Table 1

Rank Order of Essential and Non-essential Items

Item Number	Essential
1	3.294*
2	5.ØØØ*
3	5.7Ø6*
4	6.235*
5	6.294*
6	6.412*
7	7.294**
	Non-essential
1	8.529
2	8.765
3	8.882
4	9.176
5	9.471
6	1Ø.412
7	12.353
8	12.353
9	15.824

df .Ø1 = 3.23
* no signifigant difference at Level 1
** no signifigant dirrerence at Level 2

in-house research and training the teachers receive from their computer coordinator, Andrea Rossi. The 16 items and

evaluation criteria for each item was sent to these 20 teachers. The question asked for each item was whether the item and the accompaning criteria clearly indicated that the statement clearly identified what was asked. For example, item one of the questionnaire appeared as follows:

Statement
1. The program requires that the student respond in some manner before moving to the next frame?
Criteria
To evaluate this component, consider whether the program will wait indefinitely for the student to respond with 1) an answer, 2) by pressing <RETURN> or 3) by pressing "ANY KEY" thus bringing the program under the control of the student.
Question
Does this statement and accompaning evaluation criteria clearly indicate to you that you are to look for whether the program will wait as long as necessary for the student to respond before going to the next frame?

Teachers responded to each question by indicating "yes" or "no." If a "no" response was given, teachers were asked to explain why the statement or criteria was confusing. Content validity was established at .80 for each of the 16 items. Content validity was obtained for 15 of the items on the first round and for the remaining item (#1 on the non-essential item list) on the second round.

The final research questionnaire consisted of the statement, the criteria and a four point Likert-type scale for teachers to rate each item as: 4--consistently present in courseware, 3--usually present in courseware, 2--usually not found in courseware or 1--inconsistently or never found in courseware.

For Step 2, a copy of the valid research instrument was sent to each of the 20 teachers who participated in Step 1 of the study. The teachers were asked to rank the 16 items in order of importance for inclusion in computer courseware for

the learning disabled. Seventeen teachers responded. The result was the list of essential components found in Table 1. The Friedman test was used to rank the 16 items.

Step 3 involved the 17 teachers in Step 2 rating Elementary Volume I--Mathematics (Games and Drills), a courseware package produced by The Minnesota Educational Computing Corporation (MECC). Interrater agreement was established for this courseware package at .93 using analysis of variance.

For Step 4 of the project, four other courseware packages produced by MECC were distributed to four groups of LD teachers across the state of Pennsylvania. The ten teachers in each group were asked to rate one courseware packages. Table 2 summarizes the ratings for the courseware packages. A total of 57 elementary and secondary LD teachers participated in the study.

Table 2

Chisquare Analysis of Four Courseware Packages

Name of Courseware	Chisquare*	Significance
Spelling**	.Ø9	p > .Ø5
Oh Deer**	1.Ø6	p > .Ø5
Quotient Quest**	8.98	p < .Ø5***
Word Wizards**	.96	p > .Ø5

* .Ø5 with DF=1 =rejection region 3.84
** Used by permission of MECC
*** Only courseware found significant regarding interaction of importance and usage

Step 4 produced results that the essential components of courseware determined by teachers in Step 2 were not consistently found in the four courseware packages rated. A Chisquare analysis was used to arrive at this conclusion along with qualitative analysis of the data.

Qualitative Analysis of Data

Qualitative analysis supports the Chisquare data. Quotient Quest was found to contain five of the essential components of courseware with an average rating among the ten raters of 3.Ø or higher. It has the next to the lowest rating on non-essential items with an average rating of 2.68. Table 3 and Table 4 graphically represent the qualitative data described.

An average rating of 3.Ø indicated that teachers felt the courseware "usually" contained the item.

Item 1

All four courseware packages rated high indicating that teachers felt that the vocabulary level was appropriate for LD students in these programs.

Item 2

All courseware rated extremely low on recasting. The authors had developed drill-and-practice courseware and did not feel the need to provide extensive instruction.

Item 3

Oh Deer was the only package that fell below 3.Ø on this item. The graphics in this package were interesting to watch but had little purpose in relation to the program and a larger amount of material was presented on the screen during a single frame. The other three packages rated high on this item. Graphics were purposeful and directed attention to the program rather than detracting from the program. The amount to be read during any one frame was minimal.

Item 4

Ease of operation of all of the programs was evident by

the high rating on this item for all pieces of courseware. Students could respond by typing a single letter or one word.

Item 5

All courseware rated high on this component. Teachers felt that praise or giving the correct answer was sufficient. However, Quotient Quest rated the highest and it provided concrete, corrective feedback.

Item 6

All four packages rated below 3.Ø on this item. Initial directions were available but students could not control when they would go back to review directions of concepts. To review, students had to escape the program or wait until the program allowed the students to return.

Item 7

Spelling and Word Wizards rated low on this item. The only attempts to teach basic skills were in the practice of spelling words. No strategies for teaching spelling were included. Oh Deer required students to make decisions based on information not contained in the program. Quotient Quest rated high on this component. This courseware would review concepts for the student after two misses, then return to the program for practice.

There may be interactive factors involved in the importance versus usage discrepancy other than the ones that were sampled in this research that result in the underutilization of microcomputers in learning disability classes. This discrepancy seems to be evident upon close

Table 3

Table Summarizing Average Responses to Essential Elements of Computer Courseware

Item	Spelling	Oh Deer	Quotient Quest *	Word Wizard	Math I *	Item Average
1 (1)	2.6	2.5	3.3	2.4	2.2	2.5
2 (2)	3.2	2.8	3.4	3.0	2.9	3.0
3 (3)	3.0	3.8	4.0	3.3	3.8	3.7
4 (4)	3.8	2.7	3.4	3.7	3.5	3.4
5 (6)	2.9	2.3	2.7	1.9	2.4	2.7
6 (12)	2.6	2.5	2.5	1.1	2.0	2.1
7 (15)	3.3	3.3	3.9	3.1	3.2	3.2
Total Aver.	3.05	2.84	3.31	2.64	2.85	2.94

* Not included in item average.
Mathematics I has a n = 17. All others have an n = 10.

Table 4

Table Summarizing Average Responses to Nonessential Elements of Computer Courseware

Item	Spelling	Oh Deer	Quotient Quest *	Word Wizard	Math I *	Item Average
1 (5)	3.6	2.5	2.8	2.0	3.5	2.7
2 (7)	2.7	3.2	2.7	3.9	2.5	3.3
3 (8)	3.7	2.6	2.7	2.4	3.1	2.9
4 (9)	3.7	3.7	3.9	3.9	3.6	3.8
5 (10)	2.7	2.6	2.2	1.8	2.6	2.4
6 (11)	4.0	2.8	1.2	1.9	2.0	3.2
7 (13)	3.1	2.8	3.8	2.8	2.1	2.9
8 (14)	3.2	2.8	3.3	3.0	3.1	3.0
9 (16)	1.5	1.4	1.6	1.0	1.5	1.3
Total Ave.	3.13	2.71	2.68	2.52	2.67	2.83

* Not included in item average.

scrutiny of Table 3. Although Quotient Quest has the highest overall average rating (3.31), item averages show that four of the items usually found in the three other courseware packages (items 1,3,4,5 with an average rank < 3.Ø) are also those usually found in Quotient Quest. The exception to this is item 7. The other three courseware packages have an average rating of 2.5 while Quotient Quest has an average of 3.3 for item 7. It might be concluded that controlling for this one factor might be the most significant in increasing

the effectiveness of microcomputer courseware for learning disabled students.

Table 4 points out that four items on the non-essential list of computer courseware components are usually found in computer courseware. These components include:

1. Using effective animation, color-cueing, and/or underlining to focus student attention on relevant aspects to be learned;
2. Requiring the student to respond in some manner before moving to the next frame;
3. Multiple choice rather than student composed answers;
4. Providing for competition.

Quotient Quest ranks below 3.Ø on two of these items (2 and 6). This might indicate that animation, color-cueing, and or underlining that is designed to focus student attention on relevant aspects to be learned might actually interfere with learning and that multiple choice rather than requiring students to compose answers also interferes with learning. That multiple choice forms of presentation might interfere with learning seems somewhat discrepant, however, since teachers also want students to be able to operate the program with minimal keyboard skills.

Quotient Quest ranks very high, with an average rating of 3.8, on item of the non-essential components list with respect to overlearning. It may be that, even though this item was not ranked essential by the teachers in Step 2 of the study, there may be some significant interaction between the amount of overlearning through practice that is contained in a piece of computer courseware.

Limitations

Only courseware produced by MECC was used in this study. The courseware of other companies should be evaluated to determine if findings are consistent with the findings reported here. Further, the findings from these four pieces of courseware may not be typical of all MECC materials.

Further Research

The present study produced only guidelines for the production of courseware for the learning disabled. Further study is needed in the following areas:

1. The study should be replicated to determine if the same seven essential components can be derived.

2. Two pieces of courseware need to be developed having identical content but one having the essential components and one omitting the components. The two pieces of courseware can then be tested on two groups of learning disabled students to determine if significantly different levels of achievement can be obtained between the two groups.

3. Teachers should be surveyed to see if they feel there are other essential components of computer courseware.

4. Another response mode where teachers could rank as many number one statements as they wished might have produced more congruent results. Contradictory results might seem evident when comparing the essential and non-essential item list. For example, teachers rated essential that students be able to operate a program with minimal keyboard skills but rated non-essential the item that asked if answers should bve multiple choice rather than requiring students to compose answers. Another area of apparent contradiction is that

teachers rate the need for recasting of items very high to provide alternate means of presentation but rate overlearning as non-essential. However, it must be remembered that teachers were in a forced response mode when asked to rank items from one to 16 in importance. The fact that teachers could agree on seven components of courseware as consistently as they did demonstrates a high degree of unanimity on a number of essential components of courseware for the learning disabled.

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SECOND RELIABILITY STUDY

In order to establish further reliability of the findings from the original study (Lee, 1987), a second study was conducted to determine if the same essential elements for courseware production and evaluation could be achieved.

Identical Factors Between Studies

This second study was **identical** to the first in that:

1. The Friedman Test was used to discriminate essential from non-essential items.

2. The degree of freedom used with the Friedman Test was .Ø1.

3. Teachers of students with learning disabilities who use microcomputers as part of their curriculum were used in this study.

4. Hypothesis number 1 was the same for both studies.

5. The same cutoff criteria were used in making a judgment distinguishing essential from non-essential criteria.

> A large gap between the average score (AS in original study) or total average score (TAS in second study) and/or only a few items from the previous level subsumed under the next level.

Differing Factors in Second Study

The second study was **different** from the original study in the following ways:

1. Three different forms (A, B, and C) of the questionnaire were randomly distributed to participants. Each form of the questionnaire had been arranged using a list of random numbers.

One of the concerns of the original study was that those items determined essential were those closest to the beginning of the list.

2. Teachers from a different geographical location of the United States were used.

Participants in the present study were 41 learning disablity teachers from the Commonwealth of Virginia.

3. Three different Friedman Tests were run on the same data.

Participants were asked to indicate if they taught at the elementary or secondary level. Those teachers who indicated that they taught at the middle school level were included with secondary. A separate statistical test was run on the elementary and the secondary group. A third test combined both groups.

Elementary	n= 26
Secondary	n= 15
Total	n= 41

4. The Friedman Test was computed using total scores for each item on the questionnaire in place of total average scores. This yielded larger numbers but did not alter computation of significance.

Findings

Elementary Only

Hypothesis 1 was retained. A difference does exist between the rankings of the sixteen items on the questionnaire for this group of participants. The range of rejection for the elementary group was $F > 2.19$. An $F=8.93$ for this group fell outside of the range of rejection. Table 5 shows the distribution of rankings for the elementary group.

Analysis of the rankings and distribution revealed four essential items:

Item 15--The program provides the learner praise/ feedback regarding the correctness or incorrectness of his responses.

Item 2--Directions that the student must read are simple enough as to not interfere with the student's comprehension.

Item 12--The program provides alternate means of presentation of the same concept if the student does not comprehend the first presentation.

Item 6--The program provides adequate opportunities for students to review concepts.

Secondary Only

Hypothesis 1 was retained. A difference does exist between the rankings for this group of participants. The range of rejection for the secondary group was $F > 2.19$. An $F=3.10$ for this group fell outside of the range of rejection. Table 6 shows the distribution of rankings for the secondary group.

The group of secondary teachers found 10 items to be essential:

Item 7--Program uses effective animation, color-cueing, and/or underlining to focus student attention on relevant aspects to be learned.

Item 10--Adequate prompts are imbedded in the program to curtail the impulsive student and encourage the hesitant student.

Item 15--The program provides the learner praise/

feedback regarding the correctness or incorrectness of his responses.

Item 2--Directions which the student must read are simple enough as to not interfere with the student's comprehension.

Item 3--Students can operate the program with minimal keyboard skills.

Item 12--The program provides alternate means of presentation of the same concept if the student does not comprehend the first presentation.

Item 6--Program provides adequate opportunities for students to review concepts.

Item 9--The program requires the student to respond in some manner before moving on to the next frame

Item 4--Screen is uncluttered.

Item 13--The program provides for overlearning.

Comparison: Elementary and Secondary

The cutoff point for elementary teachers was at Level 2 on the Friedman Test. The cutoff point for secondary teachers was at Level 1. This cutoff point conforms with criteria 5 stated under "identical factors between studies."

Three criteria were determined essential by both the elementary and secondary group at Level 1. These items were numbers 2, 12, and 15. Level 2 for the elementary group added one additional essential item--number 6.

Comparison: Overall

The cutoff point for the entire group was at Level 3. The reason(s) for choosing this cutoff point conforms with criteria 5 stated under "identical factors between studies."

Six items were determined essential--items 2, 6, 10, 12, 13, and 15 (See Table 7). Four of these items were also among those essential to the elementary and secondary group separately. Three items (10 and 13) were essential for the secondary but not elementary.

Comparison With Original Study

Four items from the original study were determined essential in the second study--itmes 2, 6, 12, and 15 See Table 8). Three of these criteria were essential in both studies at Level 1.

Three of the essential criteria from the original study were determined as non-essential in the second study. These three criteria were:

1. Need for courseware to control for incidental learning.

2. Need for the screen to be uncluttered.

3. Need for students to have only minimal keyboard skills.

The three criteria eliminated from the essential list were three that were determined to be the most nebulous and open to individual interpretation in the original study. It should be noted, however, that all three of these criteria immediately followed the cutoff point for study two.

Summary

The criteria for the evaluation and production of microcomputer courseware for students with learning disabilities is one step closer to becoming established. The present data indicates that developers and evaluators can look for at least four criteria in courseware if it is benefit students with learning disabilities.

1. Teachers are very concerned that the directions students must read to complete the program are simple enough to not interfere with comprehension. This would indicate to this researcher that directions must be at the independent level of reading for a student.

2. Teachers are concerned that the type of feedback that students receive is both positive and corrective in nature so that students can learn from their mistakes. Courseware that simply gives praise is inadequate just as negative feedback regarding incorrectness and then moving to the next frame is inadequate. Simply giving the correct answer without explaining why is also inadequate.

3. Teachers indicate the desire for good tutorials rather than drill-and-practice by reaffirming that courseware should provide for recasting of concepts and allow students to review concepts as many times as necessary.

4. With this larger sample of teachers, two additional criteria begin to emerge. Teachers in the second study included as essential prompting and mastery learning. Prompts serve to keep the student moving through the program.

Mastery learning again indicates the desire for tutorial materials.

Strengths

The strengths of this study lie in the fact that a larger sample of teachers was used to determine the essential criteria and that data is available from a different region of the United States with four essential criteria remaining the same.

The current study also differentiates the needs of elementary and secondary students as perceived by their teachers. It demonstrates some common elements of courseware but also points out that there are differing needs between the two age-groups of students with learning disabilities. A third study is in progress in yet another geographical area of the United States to further compare results.

Limitations

Funding is currently being sought to develop courseware that contains the essential criteria established by this study. The true test of the value of these essential elements will be the increased achievement of students with learning disabilities who use courseware rated high as containing these components when compared with students using similar courseware that does not contain these components.

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Table 4

Table Showing Dependence of Ranks for Items on Research Instrument

Item	2	12	4	3	15	6	1	9	10	5	13	7	11	8	14	16
Rank	3.294	5.000	5.706	6.235	6.294	6.412	7.294	8.529	8.765	8.882	9.176	9.471	10.412	12.353	12.353	15.824
Level	1					6.524										
		2					8.23									
			3							8.936						
				4							9.465					
					5							9.524				
							6						10.524			
											7				12.406	
																8

df .01 = 3.23

Table 5
Table Showing Dependence of Ranks for Items on Research Instrument
Study Two: Elementary

Item	15	2	12	6	13	3	1	11	10	7	4	9	16	14	8	5
Rank	111	112	140	187	194	206	207	212	214	240	255	269	271	300	302	315
Level 1				188.4												
2									217.4							
3											264.4					
4													271.4			
5																

df .01 = 77.4

Table 6
Table Showing Dependence of Ranks for Items on Research Instrument
Study Two: Secondary

Item	2	4	12	6	13	15	10	7	3	9	5	16	1	8	14	11
Rank	75	81	90	108	110	112	117	132	133	133	141	151	152	162	167	176
Level	1									137.9						
		2									143.9					
			3										152.9			
				4											170.9	
							5									

df .01 = 62.9

Table 7
Table Showing Dependence of Ranks for Items on Research Instrument
Study Two: Elementary and Secondary

Item	2	15	12	6	13	10	4	3	1	7	11	9	16	5	8	14
Rank	187	223	230	295	304	331	336	339	359	372	388	402	422	456	464	467
Level 1																
	2															
		3														
			4													
				5												
					6											
						7										

df .01 = 101

Table 8: CHART COMPARING FINDINGS FROM TWO STUDIES

O--Original Study
A--All (Current Study)
E--Elementary (Current Study)
S--(Secondary (Current Study)

	O	1.	The software teaches very basic skills which non- handicapped students would learn incidentally.
*	O A E S	2.	Directions which the student must read are simple enough as to not interfere with the student's comprehension.
	O S	3.	Students can operate the program with minimal keyboard skills.
	Ø S	4.	Screen is uncluttered.
		5.	Double-spacing between lines of type.
	Ø A E S	6.	Program provides adequate opportunities for students to review concepts.
	S	7.	Program utilizes effective animation, color-cueing, and/or underlining to focus student attention on relevant aspects to be learned.
		8.	The type of lettering utilized is conducive to preventing reversals.
	S	9.	The program requires that the student respond in some manner before moving to the next frame.
	A S	1Ø.	Adequate prompts are imbedded in the program to curtail the impulsive student and encourage the hesitant student.
		11.	Answers are multiple choice rather than requiring students to compose answers.
*	Ø A E S	12.	The program provides alternate means of presentation of the same concept if the student does not comprehend the first presentation.
	A S	13.	The program provides for overlearning.

14. The program provides for competition.

* O A E S 15. The program provides the learner praise/ feedback regarding the correctness or incorrectness of his responses.

16. The program has a speech synthesizer (or the potential for a speech synthesizer) to provide auditory output to students.

* Significant at Level 1 in both studies.

MICROCOMPUTER SOFTWARE
EVALUATION QUESTIONNAIRE

Upon completion, please return in the enclosed, self-addressed, stamped envelope to:

William W. Lee
The Pennsylvania State University
158 Chambers Building
University Park, PA 16802

Please return by: 2 WEEKS

Thank you for you participation. You will be notified of the results.

Name of Respondent_____Date_____

Address_____Phone (___)_____

City_____

Courseware Evaluated: Name_____

Publisher_____

Year_____

The following criteria have been recommended by writers in the field of microcomputer courseware development as considerations for inclusion in a computer program if it is to benefit the learning disabled child to the greatest extent.

INSTRUCTIONS FOR COMPLETING THE QUESTIONNAIRE

1. Please read all of the sixteen statements and the criteria carefully before evaluating the microcomputer software program which will become part of the project in which you are participating.

2. Review the **entire piece** of courseware that has been sent to you.
   a. Review once as you would expect the poorest student in your class might use this courseware.
   b. Review a second time as you would expect the best student in your class might use this courseware.

3. Mark your responses on the questionairre in the followimg manner:
   a. Circle **YES** if the courseware consistently contains the criteria throughout.
   b. Circle **yes** if the courseware usually contains the criteria throughout.
   c. Circle **no** if the courseware usually does not contain the criteria throughout.
   d. Circle **NO** if the courseware never or inconsistently contains the criteria throughout.
   e. Please mark directly on one of the four responses and not on the line between.

4. On the last page of the questionnaire, please number the statements in the order of importance **from most essential to least essential** for inclusion in software that would make a difference in the achievement of a student who might use it.

QUESTIONS AND CRITERIA FOR EVALUATION

1. The software teaches very basic skills which non-handicapped students would learn incidentally.

To evaluate this component, consider if courseware includes the sequential teaching of basic skills rather than skipping certain steps that the author of the courseware might assume the student already knows.

YES yes no NO

2. Directions which the student must read are simple enough as to not interfere with the student's comprehension.

To evaluate this component, consider if the vocabulary used to give directions and teach concepts is at an appropriate level and can be easily read by the learner.

YES yes no NO

3. Students can operate the program with minimal keyboard skills.

To evaluate this component, consider if the types of responses are designed so that the learner can respond with only one or a few keys. The student should not have to perform complex functions in order to complete the program.

YES yes no NO

4. Screen is uncluttered.

To evaluate this component, consider if individual screens present only necessary material without excessive wording, graphics or animation that might be distracting to the learner.

YES yes no NO

5. Double-spacing between lines of type.

To evaluate this component, consider if the type on the screen leaves a space between each line.

YES yes no NO

6. **Program provides adequate opportunities for students to review concepts.**

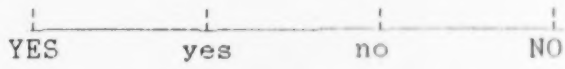
To evaluate this component, consider if the program allows the learner the control to return to previous frames for review.

7. **Program utilizes effective animation, color-cueing, and/or underlining to focus student attention on relevant aspects to be learned.**

To evaluate this component, consider if the program utilizes highlighting techniques which draw attention to the important parts of the program which must be attended to for successful completion of the program.

8. **The type of lettering utilized is conducive to preventing reversals.**

It has been determined that the type of lettering on a computer has an advantage for the learning disabled student in preventing reversals. Letters that appear on the screen are sometimes more geometrical and do not look like standard printed letters. These letters are known as low resolution letters. To evaluate this component, consider if the program uses low resolution letters--letters that are not like standard print.



9. **The program requires that the student respond in some manner before moving to the next frame.**

To evaluate this component, consider whether the program will wait indefinitely for the student to respond with: 1) an answer 2) by pressing <RETURN> or 3) by pressing "ANY KEY" thus bringing the program under the control of the student.

10. **Adequate prompts are imbedded in the program to curtail the impulsive student and encourage the hesitant student.**

To evaluate this component, consider whether the program uses prompts to try to curtail the student who responds too quickly without completely thinking though or reading necessary material (like STOP, THINK, etc.) and also prompts the student who is too hesitant and does not respond in a reasonable length of time (like PLEASE GIVE AN ANSWER, WOULD YOU LIKE TO TRY, etc.).

11. **Answers are multiple choice rather than requiring students to compose answers.**

To evaluate this component, consider if the response patterns provide choices for the student to choose from rather than requiring the student to compose answers.

12. **The program provides alternate means of presentation of the same concept if the student does not comprehend the first presentation.**

To evaluate this component, known as recasting, consider if the program provides branching to reteach a concept in a different manner if the student fails to respond to questions correctly.

13. **The program provides for overlearning.**

To evaluate this component, consider if the program provides ample opportunities to practice the skill to be learned.

14. **The program provides for competition.**

To evaluate this component, consider if the program permits the student to compete with himself by beating his own score, compete with another student by allowing at least two students to play at the same time, or moves the student to successively higher and more difficult levels.

15. **The program provides the learner praise/feedback regarding the correctness or incorrectness of his responses.**

To evaluate this component, consider whether the program provides praise for right answers but, additionally, explains to the student why his answer is incorrect or, at least, gives the student the correct answer after a number of attempts as opposed to going into a continuous loop or proceeding to the next frame without giving the student knowledge regarding why he was wrong.

16. **The program has a speech synthesizer (or the potential for a speech synthesizer) to provide auditory output to students.**

To evaluate this component, consider whether the program provides (or has the imbedded potential for) the use of a speech synthesizer to read the printed word on the screen to the student who is dyslexic or otherwise has reading difficulties.

YES	yes	no	NO

REMEMBER TO GO ON TO THE NEXT PAGE

Please rank the following sixteen statements in the order from most essential to least essential in your judgment regarding their importance for inclusion in software to increase the achievement of learning disabled students.

___1. The software teaches very basic skills which non-handicapped students would learn incidentally.

___2. Directions which the student must read are simple enough as to not interfere with the student's comprehension.

___3. Students can operate the program with minimal keyboard skills.

___4. Screen is uncluttered.

___5. Double-spacing between lines of type.

___6. Program provides adequate opportunities for students to review concepts.

___7. Program utilizes effective animation, color-cueing, and/or underlining to focus student attention on relevant aspects to be learned.

___8. The type of lettering utilized is conducive to preventing reversals.

___9. The program requires that the student respond in some manner before moving to the next frame.

___10. Adequate prompts are imbedded in the program to curtail the impulsive student and encourage the hesitant student.

___11. Answers are multiple choice rather than requiring students to compose answers.

___12. The program provides alternate means of presentation of the same concept if the student does not comprehend the first presentation.

___13. The program provides for overlearning.

___14. The program provides for competition.

___15. The program provides the learner praise/feedback regarding the correctness or incorrectness of his responses.

___16. The program has a speech synthesizer (or the potential for a speech synthesizer) to provide auditory output to students.

THE QUESTIONAIRRE IS NOW COMPLETED